WHAT IS CLAIMED IS:

1. A lithium-manganese complex oxide having a spinel crystalline structure, which is represented by a formula $Li[Mn_{2-X-Y}Li_XM_Y]O_{4+\delta}$, wherein M is at least one element selected from the groups IIa, IIIb and VIII of the 3rd and 4th periods, and $0.02 \leq X \leq 0.10$, $0.05 \leq Y \leq 0.30$ and $-0.2 \leq \delta \leq 0.2$, wherein half value width of the (400) plane of powder X-ray diffraction by CuKα is 0.22° or less, and average diameter of crystal grains by SEM observation is 2 μm or less.

2. The lithium-manganese complex oxide having a spinel crystalline structure as claimed in claim 1, wherein M is one metal selected from the group consisting of Mg, Ni, Al and Fe.

3. The lithium-manganese complex oxide having a spinel crystalline structure as claimed in claim 1, wherein BET specific surface area is 1.0 $m^2 \cdot g^{-1}$ or less.

4. The lithium-manganese complex oxide having a spinel crystalline structure as claimed in claim 2, wherein BET specific surface area is 1.0 $m^2 \cdot g^{-1}$ or less.

5. An Mn-M complex oxide slurry which is obtained by adding an alkali to a metal salt aqueous solution of M of at least one element selected from the groups IIa, IIIb and VIII of the 3rd and 4th periods containing electrolytic manganese dioxide as the manganese material, while stirring the solution.

6. The Mn-M complex oxide slurry as claimed in claim 5, wherein BET specific surface area of the electrolytic manganese dioxide is 30 to 40 m^2/g.

7. A method for producing the lithium-manganese complex oxide claimed in claim 1, which comprises adding a lithium material to an Mn-M complex oxide slurry and baking the mixture in the air or in an atmosphere of high concentration oxygen including pure oxygen atmosphere, wherein the Mn-M complex oxide slurry is obtained by adding an alkali to a metal salt aqueous solution of M containing electrolytic manganese dioxide as the manganese material, while stirring the solution.

8. A method for producing the lithium-manganese complex oxide claimed in claim 2, which comprises adding a lithium material to an Mn-M complex oxide slurry and baking the mixture in the air or in an atmosphere of high concentration oxygen including pure oxygen atmosphere, wherein the Mn-M complex oxide slurry is obtained by adding an alkali to a metal salt aqueous solution of M containing electrolytic manganese dioxide as the manganese material, while stirring the solution.

9. A method for producing the lithium-manganese complex oxide claimed in claim 3, which comprises adding a lithium material to an Mn-M complex oxide slurry and baking the mixture in the air or in an atmosphere of high concentration oxygen including pure oxygen atmosphere,

wherein the Mn-M complex oxide slurry is obtained by adding an alkali to a metal salt aqueous solution of M containing electrolytic manganese dioxide as the manganese material, while stirring the solution.

10. A method for producing the lithium-manganese complex oxide claimed in claim 4, which comprises adding a lithium material to an Mn-M complex oxide slurry and baking the mixture in the air or in an atmosphere of high concentration oxygen including pure oxygen atmosphere, wherein the Mn-M complex oxide slurry is obtained by adding an alkali to a metal salt aqueous solution of M containing electrolytic manganese dioxide as the manganese material, while stirring the solution.

11. The method for producing lithium-manganese complex oxide as claimed in claim 7, wherein average grain diameter of the lithium material is 5 μm or less.

12. The method for producing lithium-manganese complex oxide as claimed in claim 8, wherein average grain diameter of the lithium material is 5 μm or less.

13. The method for producing lithium-manganese complex oxide as claimed in claim 9, wherein average grain diameter of the lithium material is 5 μm or less.

14. The method for producing lithium-manganese complex oxide as claimed in claim 10, wherein average grain diameter of the lithium material is 5 μm or less.

15. A lithium secondary battery which has a capacity

maintaining ratio of 99% or more after 50 cycles of charge and discharge using at least one substance selected from lithium, lithium alloys and compounds capable of charging and discharging lithium as the negative electrode, a non-aqueous electrolyte as the electrolyte and the lithium-manganese complex oxide claimed in claim 1 as the positive electrode.

16. A lithium secondary battery which has a capacity maintaining ratio of 99% or more after 50 cycles of charge and discharge using at least one substance selected from lithium, lithium alloys and compounds capable of charging and discharging lithium as the negative electrode, a non-aqueous electrolyte as the electrolyte and the lithium-manganese complex oxide claimed in claim 2 as the positive electrode.

17. A lithium secondary battery which has a capacity maintaining ratio of 99% or more after 50 cycles of charge and discharge using at least one substance selected from lithium, lithium alloys and compounds capable of charging and discharging lithium as the negative electrode, a non-aqueous electrolyte as the electrolyte and the lithium-manganese complex oxide claimed in claim 3 as the positive electrode.

18. A lithium secondary battery which has a capacity maintaining ratio of 99% or more after 50 cycles of charge and discharge using at least one substance selected from

lithium, lithium alloys and compounds capable of charging and discharging lithium as the negative electrode, a non-aqueous electrolyte as the electrolyte and the lithium-manganese complex oxide claimed in claim 4 as the positive electrode.